

VESDA®

Introduction to the System Design Manual

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Document Conventions

The following typographic conventions are used in this document.

Convention	Description
Bold	Used to denote: emphasis Used for names of menus, menu options, toolbar buttons
<i>Italics</i>	Used to denote: references to other parts of this document or other documents. Used for the result of an action.

The following icons are used in this document

Convention	Description
	Caution: This icon is used to indicate that there is a danger to equipment. The danger could be loss of data, physical damage, or permanent corruption of configuration details.
	Warning: This icon is used to indicate that there is a danger of electric shock. This may lead to death or permanent injury.



Warning: This icon is used to indicate that there is a danger of inhaling dangerous substances. This may lead to death or permanent injury.

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Codes and Standards Information for Air Sampling Smoke Detection

We strongly recommend that this document is read in conjunction with the appropriate local codes and standards for smoke detection and electrical connections. This document contains generic product information and some sections may not comply with all local codes and standards. In these cases, the local codes and standards must take precedence. The information below was correct at time of printing but may now be out of date, check with your local codes, standards and listings for the current restrictions.

FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, the user is encouraged to try to correct the interference by one or more of the following measures; re-orientate or relocate the receiving antenna, increase the separation between the equipment and receiver, connect the equipment to a power outlet which is on a different power circuit to the receiver or consult the dealer or an experienced radio/television technician for help.

FDA

This VESDA product incorporates a laser device and is classified as a Class 1 laser product that complies with FDA regulations 21 CFR 1040.10. The laser is housed in a sealed detector chamber and contains no serviceable parts. The laser emits invisible light and can be hazardous if viewed with the naked eye. Under no circumstances should the detector chamber be opened.

FM Hazardous Applications

3611 Hazardous Approval Warning: Exposure to some chemicals may degrade the sealing of relays used on the detector. Relays used on the detector are marked "TX2-5V", "G6S-2-5V" or "EC2-5NU".

VESDA detectors must not be connected or disconnected to a PC while the equipment is powered in an FM Division 2 hazardous (classified) location (defined by FM 3611).

FM Approved Applications

The product must be powered from VPS-100US-120, VPS-100US-220 or VPS-220 only.

ONORM F3014

ONORM F3014, transport times for all tubes (including capillaries) must not exceed 60 seconds from any hole. This means that the pre-designed pipe networks that include capillaries cannot be used.

AS1603.8

The performance of this product is dependent upon the configuration of the pipe network. Any extensions or modifications to the pipe network may cause the product to stop working correctly. You must check that ASPIRE2 approves alterations before making any changes. ASPIRE2 is available from your VESDA ASD distributor.

AS1851.1 2005

Maintenance Standards. Wherever this document and the AS1851.1 differ, AS1851.1 should be followed in preference to this document.

European Installations

The product must use a power supply conforming to EN54: Part 4.

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1.1 Scope

The System Design Manual provides an overview of the VESDA Laser Detection Systems. It briefly explains concepts of Aspirating Smoke Detection and Smoke Obscuration.

This manual is written for those involved with the management and purchase of VESDA Laser systems, consultants, specifiers and any one requiring an overview of the VESDA Laser Detection Systems.

1.2 Introduction

The VESDA Laser System is an Aspirating Smoke Detection (ASD) System capable of detecting smoke at low obscuration levels. This enabling detection of smoke at the incipient stage. VESDA Laser Systems are successfully operating in applications ranging from ultra clean to harsh dirty environments. The laser detectors have a variety of alarm levels. The thresholds for each alarm level can be set to suit specific site conditions.

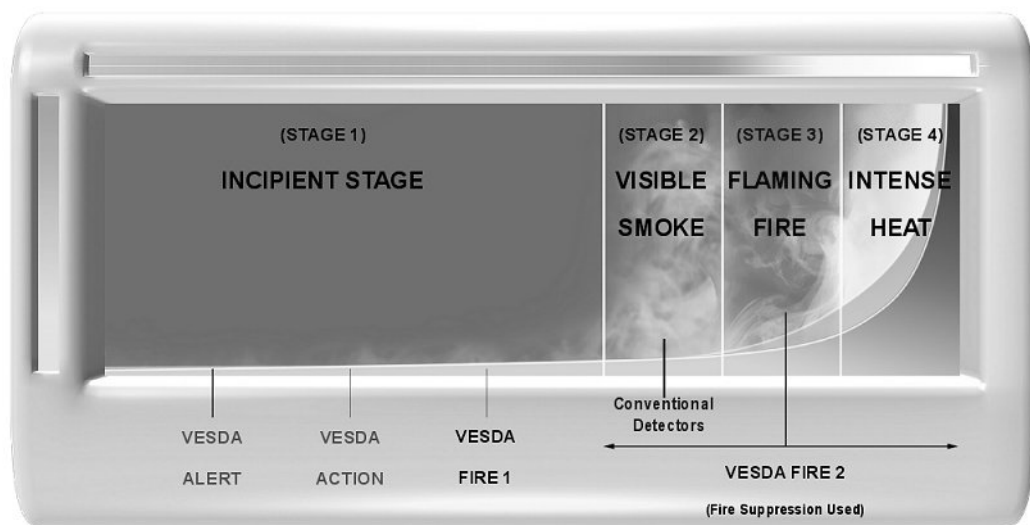


Figure 1 - Detectors sensitivity to detect smoke at various stages of a Fire

1.3 Introduction to Aspirating Smoke Detection

An Aspirating Smoke Detection System such as the VESDA Laser System, incorporates a network of pipes with sampling holes continuously collecting air samples from the area being protected. The sample air in the pipe network is drawn to the detector by a high efficiency aspirator. The detector can detect minute concentrations of smoke, this is expressed as % obs per meter or foot.

The success of an ASD system is dependent upon the smoke reaching the sampling holes and being efficiently transported to a detector. A well designed pipe network takes into account the natural and mechanically induced airflows within a customer site to ensure that air travels in the direction of the sampling holes. The length of the pipe and the number of changes in direction of the pipe will impact on the efficiency of an ASD System. Refer to the VESDA *Pipe Network Design*, *Pipe Network Installation* and the *ASPIRE2 User Guide* for information on proper pipe network design and installation.

The versatility of the VESDA Aspiring Smoke Detection System means that it can be successfully used in a diverse range of industry sectors and application environments. For information on designing systems to meet the requirements of a specific application environment contact your nearest VESDA Laser Detector Sales Office for copies of the Application Design Guides.

1.4 Introduction to Obscuration

Smoke obscuration is the effect of smoke on visibility. It is the most widely accepted measure for expressing the concentration of smoke and refers to the percentage of light that is blocked, or obscured over a specified length (meter/foot). Increase in obscuration levels decreases visibility, hence an obscuration of 10% obs/m (3.13% obs/ft.) will reduce visibility to 90%.

Typically pure oxygen has an obscuration rate of 0% obs/m (0% obs/ft.). At 0.01% obs/m (0.003% obs/ft.) visibility levels are in the order of approximately 40 Km.

Incipient smoke, invisible to the naked eye in ordinary conditions has an obscuration range of 0.1% obs/m to 1% obs/m (0.03125% obs/ft. to 0.3125% obs/ft.). The figure below shows the relationship between increase in obscuration and decrease in visibility. Obscuration is used to define the sensitivity level of a smoke detector. The alarm sensitivity range for VESDA laser detectors can begin at 0.005% obs/m (0.0015% obs/ft.), allowing detection of smoke at the incipient stage from overheating wires or equipment.

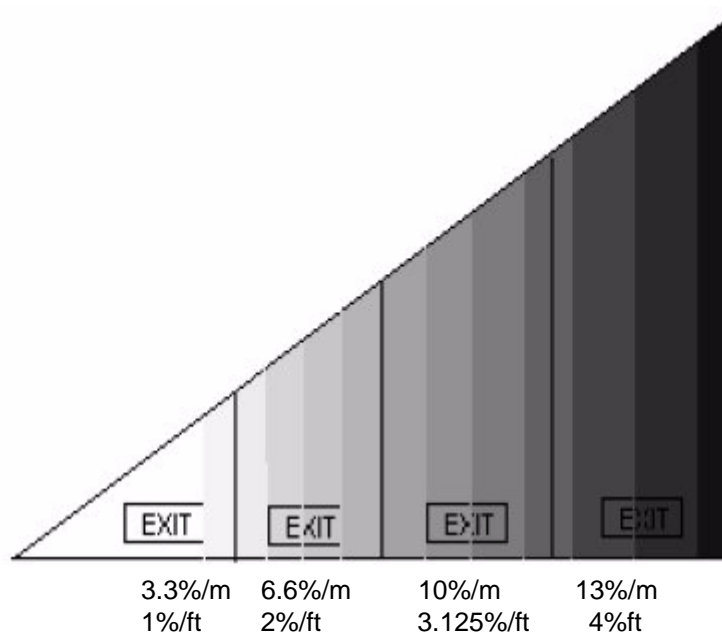


Figure 2 - Relationship between increase in obscuration and decrease in visibility

1.5 Introduction to the VESDA Laser System

The VESDA Laser System incorporates a network of pipes, detectors and supporting devices, and a communications network. It is a versatile modular system that can be designed to meet site specific requirements. The system can be broadly divided into:

- Pipe Network
- Laser Detectors
- Software
- Communications Network

The System Design Manual also covers topics such as *Commissioning*, *Troubleshooting* and *Accessories*.

Pipe Network

Each detector is connected to a pipe network. The pipe network collects air samples through sampling holes from a designated protected area and transports the sample air to the detector. The *VESDA Pipe Network Design Guide* and the *VESDA Pipe Network Installation Guide* explain in detail the design and installation requirements for an efficient pipe network.

Laser Detectors

There are four standard detectors:

VESDA LaserPLUS (VLP) - The VESDA LaserPLUS detector can be connected to four pipes, each of these can be further branched into two. For further details see the *VESDA LaserPLUS Product Manual*.



Figure 3 - VESDA LaserPLUS Detector

VESDA LaserSCANNER (VLS) - The VESDA LaserSCANNER Detector can be connected to four pipes that may be further branched into two. The Laser SCANNER Detector can identify the pipe which introduces the smoke and will monitor and report on the progress of the occurrence for the relevant sector in the protected area. The LaserSCANNER Detector has four Alarm Thresholds. For further details see the *VESDA LaserSCANNER Product Manual*.



Figure 4 - VESDA LaserSCANNER Detector

VESDA LaserCOMPACT (VLC) - The VESDA LaserCOMPACT is connected to one pipe that may be branched into two. The LaserCOMPACT has three Alarm Thresholds. For further details see the *VESDA LaserCOMPACT Product Manual*.



Figure 5 - VESDA LaserCOMPACT Detector

VESDA LaserFOCUS (VLF) - The VESDA LaserFOCUS is connected to one pipe that comes with a number of preconfigured pipe layouts. The LaserCOMPACT has four alarm thresholds. For further details see the *VESDA LaserFOCUS Product Manual*.

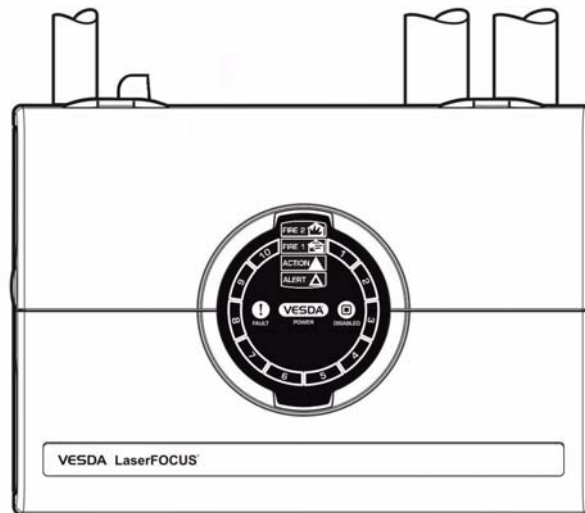


Figure 6 - VESDA LaserFOCUS Detector

An aspirator in each detectors draws air through the pipe network into a pipe inlet manifold to a two stage air filter cartridge. The two stage air filter cartridge filters the sampled air, which then flows on to the laser chamber. Most of the filtered air sample is used to detect the presence of smoke, the remaining air is used to protect the optical surfaces in the laser chamber. The laser chamber can detect smoke at minute levels of obscuration. If smoke is detected it is reported through the CPU card to the display assigned to the detector. Presence of smoke can also be displayed on a LCD Programmer or through a VESDA PC Software. The detector can be configured to raise alarms at different levels and/or report events through a Fire Alarm Control Panel (FACP).

VESDA PC Software

VESDA PC Software has been developed to configure, manage and maintain a VESDA Laser System. The software packages allow varying degree of *functions* to the System.

Communications Network

VESDA Laser System communicates over a fault tolerant, bidirectional VESDAnet communications network. Each VESDA Laser Product in the system is connected to VESDAnet. Details on VESDAnet can be found in the *VESDA Communications Guide*.

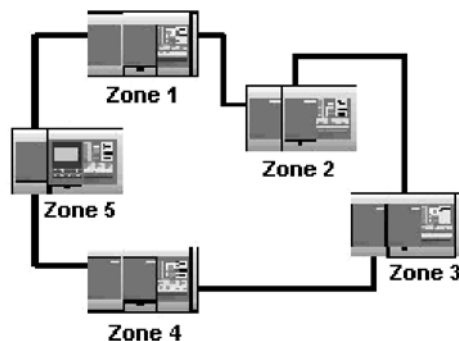


Figure 7 - An example of VESDAnet

Connecting the VESDA Systems to External Systems

The VESDA Laser System can be integrated to external Fire Alarm Control Panels and other building management systems to raise pre-alarm and alarm conditions, action automatic emergency procedures, and shut down ventilation systems. It can also be integrated into an automatic fire suppressant release system.

Approvals

VESDA Laser Products have been approved by all internationally recognized approvals agencies. Following is a listing of the approvals received for some VESDA Laser Products:

- UL - Underwriters Laboratories
- SSL - Australia
- CSIRO - Australia
- FM - Factory Mutual
- ULC - Underwriters Laboratories Canada
- LPC - Loss Prevention Council - United Kingdom
- VdS - Germany
- NTC - Mainland China
- CSFM - California State Fire Marshall
- New York - MEA
- AFNOR - France
- SMA C-tick
- CE Mark

For details on the approvals visit the VESDA web site at www.vesda.com

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